

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP00/05875

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl⁷ H01S3/131, 3/00
G02F1/01, 1/37

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl⁷ H01S3/00-3/30
G02F1/00-1/125, 1/35-1/39

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1940-1996 Toroku Jitsuyo Shinan Koho 1994-2000
Kokai Jitsuyo Shinan Koho 1971-1996 Jitsuyo Shinan Toroku Koho 1996-2000

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP, 08-334803, A (Nikon Corporation), 17 December, 1996 (17.12.96), Fig. 1; Claims 1 to 4; Par. Nos. 39 to 45, 50, 146 (Family: none)	1-30, 40-42, 77-80, 85, 86, 102, 103
Y	EP, 889335, A2 (Hoya Corporation), 07 January, 1999 (07.01.99), Fig. 1; Claim 1 & JP, 11-023878, A	1-30, 40-42, 77-80, 85, 86, 102, 103
Y	EP, 859435, A2 (Corning Incorporated, Northern Telecom Limited), 19 August, 1998 (19.08.98), Fig. 14; pp.12-13 & JP, 11-068216, A & GB, 2322228, A & AU, 5301498, A & WO, 98036294, A	7, 8, 19-21, 40-42
A	JP, 04-022928, A (NEC Corporation), 27 January, 1992 (27.01.92), Full text (Family: none)	7, 8

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search
29 November, 2000 (29.11.00)

Date of mailing of the international search report
12 December, 2000 (12.12.00)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP, 03-235924, A (Nippon Telegr. & Teleph. Corp. <NTT>), 21 October, 1991 (21.10.91), Fig. 5; example 3 (Family: none)	7, 8
A	JP, 05-291676, A (Nippon Telegr. & Teleph. Corp. <NTT>), 05 November, 1993 (05.11.93), Claim 1 (Family: none)	19-21, 40-42
A	JP, 05-037066, A (NEC Corporation), 12 February, 1993 (12.02.93), Full text (Family: none)	19-21, 40-42
A	JP, 59-055083, A (Fujitsu Limited), 29 March, 1984 (29.03.84), Full text (Family: none)	19-21, 40-42
A	US, 4790619, A (American Telephone and Telegraph Company), 13 December, 1988 (13.12.88), Claims 1, 3 & JP, 63-011916, A & EP, 248517, A2 & DK, 207887, A & CA, 1277404, A	21, 42
A	US, 4923279, A (British Telecommunications plc), 08 May, 1990 (08.05.90), Column 2, lines 18 to 24 & JP, 01-145881, A & EP, 313209, A1 & GB, 8724736, A & CA, 1327845, A & GR, 3006615, T & ES, 2052736, T & HK, 128796, A & SG, 47966, A & DE, 3856092, T	21, 42
A	JP, 55-044758, A (NEC Corporation), 29 March, 1980 (29.03.80), Full text (Family: none)	21, 42
A	JP, 54-125189, A (Matsushita Electric Ind. Co., Ltd.), 28 September, 1979 (28.09.79), Full text (Family: none)	21, 42
A	JP, 11-004031, A (Nikon Corporation), 06 January, 1999 (06.01.99), Full text (Family: none)	20, 41, 42

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Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. The inventions of claims 1-30, 40-42, 77-80, 85, 86 relate to a light source or for producing a single wavelength light an exposure apparatus, involving a technical feature of comprising an optical amplifying unit comprising a group of optical fibers or light paths and a control unit for controlling the intensity of light outputted from each optical fiber or the optical amplifying unit by independently turning on/off the intensity of light outputted from each optical fiber or the optical amplifying unit, and the inventions of claims 102, 103 relate to a technical matter in which the use of the exposure apparatus is limited to device manufacture.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
Claims 1-30, 40-42, 77-80, 85, 86, 102, 103.

Remark on Protest ☐ The additional search fees were accompanied by the applicant's protest.

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Continuation of Box No.II of continuation of first sheet (1)

2. The inventions of claims 31-42, 83, 84, 86 relate to a light source or exposure apparatus involving a technical feature comprising a light producing unit having a light source for producing a single wavelength light and a light modulator for converting the light from the light source to an optical pulse, an optical amplifying unit having at least one fiber amplifier for amplifying the optical pulse produced by the light producing unit, and a control unit for controlling the peak power of the optical pulse; the inventions of claims 96-98 relate to an exposure method adopted to the exposure apparatus; and the inventions of claims 102, 103 relate to a technical matter in which the use of the exposure apparatus is limited to device manufacture.

3. The inventions of claims 43-52 relate to a light source involving a technical feature of comprising a first control unit for calibrating the wavelength according to the data on the temperature dependence of the measurement reference wavelength of a beam monitoring mechanism.

4. The inventions of claims 53-65, 92 relate to a light source or an exposure apparatus involving a technical feature comprising a polarization adjuster for causing the polarizations of the beams of light of the same wavelength transmitted through optical fibers to agree with each other and a polarization direction converting unit for converting all the beams through the optical fibers to linearly polarized beams having the same polarization direction; and the inventions of claims 102, 103 relate to a technical matter in which the use of the exposure apparatus is limited to device manufacture.

5. The inventions of claims 66-70, 93-95 relate to a light source or an exposure apparatus involving a technical feature comprising an optical waveguide member mainly made of either phosphate glass to which a rare earth element is added or bismuth oxide glass and an optical amplifier for amplifying an incident light beam; the invention of claim 101 relates to an adjusting method applied to the exposure apparatus; and the inventions of claims 102, 103 relate to a technical matter in which the use of the exposure apparatus is limited to device manufacture.

6. The inventions of claims 71-76, 99, 100 relate to a wavelength stabilization control method or an exposure method involving a technical feature of including a first step of previously measuring the temperature dependence of the measurement reference wavelength of a wavelength sensor for measuring the wavelength of a laser beam, a second step of performing absolute wavelength calibration to cause the measurement reference wavelength of the wavelength sensor to agree with an absolute wavelength, approximate to a preset wavelength, provided by an absolute wavelength providing source for providing the absolute wavelength, and a third step of setting the measurement reference wavelength of the wavelength sensor at the preset wavelength; the inventions of claims 87-90 relate to an exposure apparatus comprising a control unit for adopting the control method or the exposure method; and the inventions of claims 104, 105 relate to a device manufacturing method in which the exposure method is used in a lithography step and a device.

7. The inventions of claims 81, 82, 84, 86 relate to an exposure apparatus involving a technical feature of comprising a light producing unit having a light source for producing a single wavelength light and a light modulator for converting the light from the light source to an optical pulse, an optical amplifying unit having at least one fiber amplifier for amplifying the optical pulse produced by the light producing unit, and a control unit for controlling the frequency of the optical pulse; the inventions of claims 96-98 relate to an exposure method adopted to the exposure apparatus; the inventions of claims 102, 103 relate to a technical matter in which the use of the exposure apparatus is limited to device manufacture; and the inventions of claims 104, 105 relate to a device manufacturing method in which the exposure method is used in a lithography step and a device.

8. The invention of claim 91 relates to an exposure apparatus involving a technical feature of comprising an exposure control unit for controlling the integral exposure applied to a substrate according to the variation of the sensitivity characteristic of the photosensitive agent caused by a change of wavelength.

There is no technical relationship among the eight groups of inventions involving one or more of the same or corresponding special technical features.